Effects of the National Forests in Florida 1999 Revised Land and Resource Management Plan on the Scrub Pigeon-Wing (*Clitoria fragrans*)

Addendum to the Biological Assessment for the Revised Land and Resource Management Plan

On May 7, 2014, a Florida Natural Areas Inventory employee discovered a group of *Clitoria fragrans* individuals on the Seminole Ranger District of the Ocala National Forest (ONF). A second location was later found on the Lake George Ranger District in 2015. Due to the discovery of this federally listed plant species on the ONF, we are reinitiating consultation regarding the effects of implementing the National Forests in Florida Revised Land and Resource Management Plan (Forest Plan; USDA 1999) on the scrub pigeon wings (*Clitoria fragrans*). The action area for this analysis is all sandhill and scrub ecosystems on the ONF.

Ecology of the species relevant for this analysis

Nearly all of the previously known populations of *C. fragrans* are in Polk and Highlands Co. on the Lake Wales Ridge in southern peninsular Florida. The University of Florida herbarium has three specimens collected in 1980 from Lake Co. south of the forest boundary; the status of that population is unknown. Except for this record, the two populations found on the Ocala National Forest are disjunct from other extant populations but appear to have similar habitat preferences.

Clitoria fragrans habitat has been described as scrub, turkey oak barrens, "edge of high pine", "scrubby high pine", "hickory-dominated scrub", and "habitats intermediate between high pine and scrub" (Fantz 1977, Chafin 2000). The species has been found on both yellow and white sand soils. The varied descriptions of the species' preferred habitat are likely indicative of its presence in the complex continuum of xeric, fire-dependent upland habitats in central Florida's ridge systems (NatureServe 2015). Fire frequency varies among specific vegetation types but is required to manage for what seems to be high-quality *C. fragrans* habitat. Plant life history also suggests fire adaptation: low seed production, long life, a deep vertical taproot and substantial horizontal rhizome all suggest that individual plants should resprout following fire or other disturbance (USFWS 1999, Palazzo et al. 2007). However, Weekley and Menges (2003) found only a moderate postburn resprouting response with some potential fire-caused mortality. Based on the limited and somewhat contradictory information available, it appears that fire may kill or damage some individuals, but many individuals resprout after fire and, more importantly, fire is required for maintaining *C. fragrans* habitat.

Status of the Species Within the Action Area

On May 7, 2014, a Florida Natural Areas Inventory employee discovered a group of 60 *Clitoria fragrans* individuals within Compartment 248 of the Seminole Ranger District on the Ocala National Forest. A specimen was collected and vouchered in the University of Florida herbarium. In May 2015, a second group of *C. fragrans* was discovered within Compartment 12 of the Lake George Ranger District. These are the only two current confirmed locations of the species on the Ocala National Forest. See Map 1 for locations of the two known populations. Appendix 1 contains 6 photos of the plants and general habitat. The initial vouchered location is in sand pine scrub habitat and the second location is in xeric high pine/sandhills.

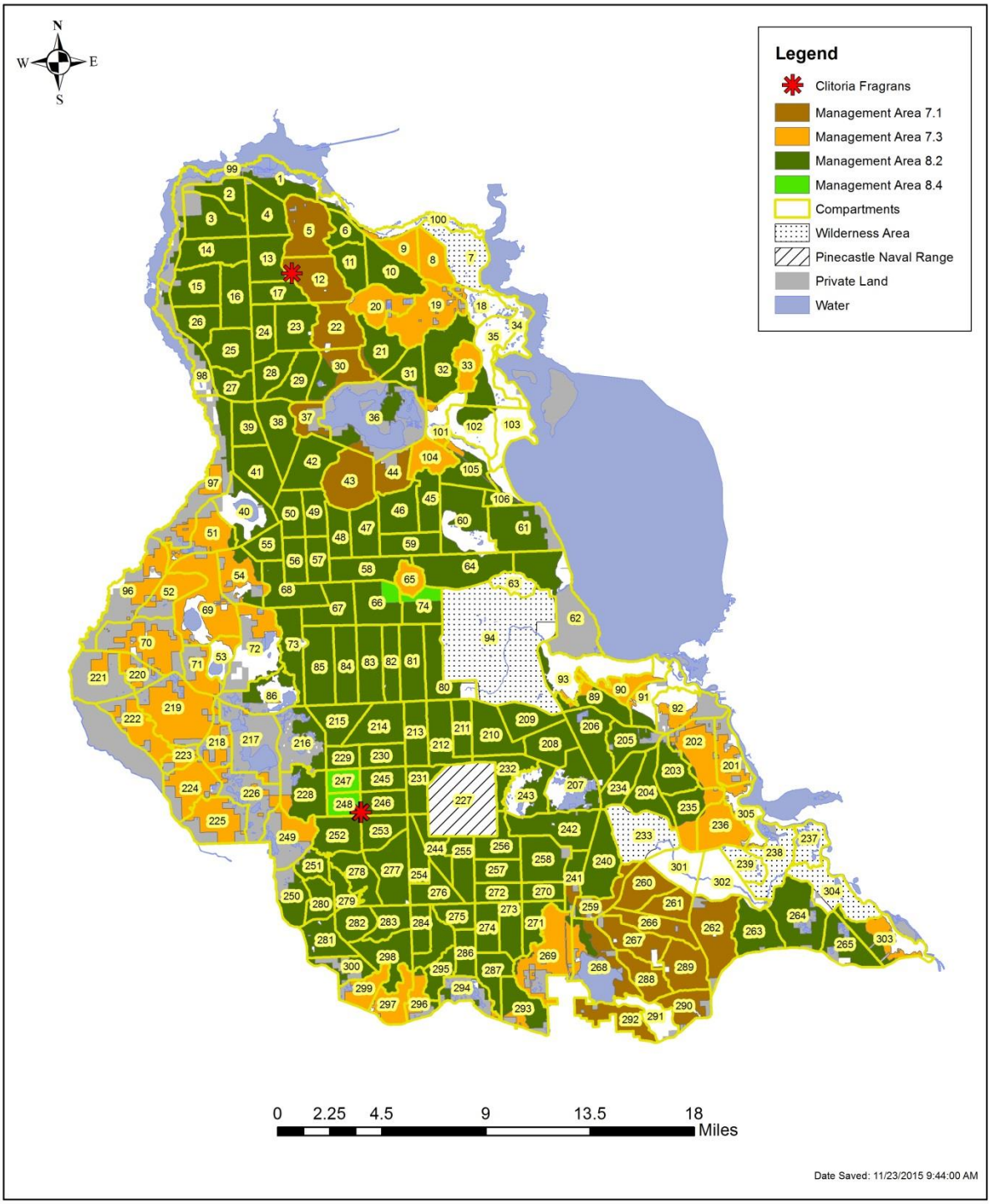
The plants in the first location are in stand of nearly mature sand pine that was part of a prescribed burn conducted on 11/14/2013 in a Scrub-Jay Management Area. Most of the sand pines were killed as a result of the burn. The *C. fragrans* individuals within this stand are located in a small, linear gap that extends from the south stand edge to approximately 75 meters north into the stand interior. The adjacent stand was roller-chopped for burn preparation, and this gap is likely from the operators of the dozer and roller-chopper parking their equipment in the mature stand for concealment during down time. The presence of this gap was likely a key component for the species' presence in this particular stand. This area did not receive the highest intensity fire behavior during the burn since it was located near the baseline of the burn and received mostly backing fire, but the fire did get intense enough to kill several sand pines in the overstory. There were 60 *C. fragrans* individuals counted at the initial discovery. The vouchered specimen can be found online at: http://www.flmnh.ufl.edu/herbarium/specimens/zoom/imagezoom_html5.asp?folder=241&image=241702a1.

The second location of *C. fragrans* is in xeric high pine/sandhills habitat. The stand had longleaf pine removed in 1996 and was subsequently site prepped using herbicide in 1999 and replanted with longleaf in 2000. The stand has been burned regularly alternating between growing season and dormant season burns. The last four burns were on 7/30/2008, 3/4/2010, 1/20/2012, and 6/4/2014. The habitat is a mix of turkey oak and 15-year old longleaf pines from the planting in 2000, with scattered mature longleaf in the overstory. The plants are located in two close concentrations under shade from turkey oaks and in open small sandy openings in between canopy cover. There were an "estimated 100-200 plants" at this location (J. Surdick, pers. comm.).

It should be noted that despite visits throughout the normal months that *C. fragrans* flowers, no individuals were observed flowering in either location (J. Surdick, pers. comm.). Seed and seedling ecology of *C. fragrans* is largely unknown.

Clitoria fragrans is very similar in appearance to *Clitoria mariana*, a common species in the scrub and sandhills of the ONF, and a *Desmodium* species that has a similar habit and leaf shape, but very different fruits and flowers (USFWS 1999, J. Surdick, pers. comm.). Given this similarity and the fact that *C. fragrans* was found in two different habitats, it is likely that there are additional undiscovered locations elsewhere in the ONF. The following discussion therefore evaluates the effects of implementing the Forest Plan on all potential sandhill and scrub habitat. The discussion below focuses on the effects resulting from activities on Management Areas 7.1, 7.3, 8.2, and 8.4 as these MAs cover the majority of the sandhill and scrub habitat. Other MAs have sandhill and scrub habitat within their boundaries, but do not have activities occurring that could affect *C. fragrans,* with the exception of off-highway vehicle (OHV) use which is discussed below.

Map 1. Scrub Pigeon Wings Locations and Management Areas



Proposed Actions in Detail

The proposed action considered in this analysis is implementation of the overall management direction described in the National Forests in Florida Forest Plan (USDA 1999). The Forest Plan and amendments are available at http://www.fs.usda.gov/detail/florida/landmanagement/?cid=stelprdb5269793 and http://www.fs.usda.gov/detail/florida/landmanagement/?cid=stelprdb5269794, respectively. The Ocala National Forest is divided into Management Areas (MAs) for which the Forest Plan provides a description of desired conditions and direction for management activities. Although not all activities would be implemented in all areas, a brief synopsis of potentially relevant activities is below.

Timber harvest would occur as a method of providing timber products (in MA 8.2), removing overstory and setting back succession (in MA 8.4), or removing off-site species and opening the understory (in MA 7.1 & 7.3). In MAs 8.2 & 8.4, sand pines could be clearcut using a feller-buncher, skidder, and front loader. In MAs 7.1 & 7.3, slash or loblolly pines could be taken selectively on a case-by-case basis.

Timber thinning would occur in sandhills habitats as a method of reducing the density of overstory trees and removing off-site species. A feller-buncher, skidder, and front-loader could be used. Smaller machinery is often employed to maneuver between rows of trees when present. Every other row or every third row could be harvested depending on tree density. Projects may also selectively thin when rows are not present. Disturbance is reduced in thinning operations due to the reduced volume being removed from project stands.

Roller-chopping would occur as a post-harvest site preparation for seeding (in MA 8.2) or prescribed burning operations (in MAs 8.2 and 8.4). This activity uses large drums with blades that are spaced 12 to 18 inches apart and sink 8 to 10 inches into the soil. Chopping typically disturbs 90% of vegetation less than 6 inches in diameter. Chopping breaks down post-harvest logging debris, prepares the seed bed, and moderates oak resprouting. A roller-chopping layout that leaves intermittent areas of undisturbed vegetation (i.e., the "sloppy chop") is encouraged to promote small-scale habitat variability.

Prescribed burning may also be carried out as a method of site preparation for seeding (in MA 8.2 and as a treatment to set back succession in the scrub (in MA 8.4) and to promote ground cover and limit midstory growth in the sandhills (in MAs 7.1 & 7.3) when conditions allow. The effects of prescribed burning on federally listed plant species on the Ocala National Forest is included in the Biological Assessment and Biological Opinion for the Forest Plan (USDA 1999b).

Seeding would be carried out as a method of restocking stands managed for sand pine in MA 8.2 only. Seeding would occur within 12 to 15 months of harvest and would occur after roller-chopping or prescribed burning activities. Seeding uses a farm tractor with attachments that drop sand pine seeds in an arrangement providing 6' x 8' spacing throughout the stand. Cables on the front and back of the tractor prepare the soil and cover up the seed after it is dropped. In stands that appear to have sufficient natural regeneration, every other row is seeded.

Planting would occur as a method of reforestation and restoration in sandhills habitats. Planting could done by hand or using machinery. Hand planting involves using a planting crew that plants seedlings using a planting shovel. Mechanical planting involves using a planting machine that creates a 2-3' furrow in the soil and seedlings are inserted into the furrow by the machine or an operator.

Mowing would occur as a method of mid-story reduction in sandhills habitats. Mowing involves masticating small diameter (usually 8-10") midstory trees and shrubs with a GyroTrac or similar tracked vehicle. If the site is to be burned, the downed debris may be mulched, in which case trees are passed over multiple times with the machinery to break it down into smaller pieces.

Off-highway vehicle (OHV) recreation occurs on the ONF on designated trails. There are a total of 188 miles of OHV trails on the ONF, with roughly 46 miles occurring in sandhills habitat and the remainder occurring in sand pine scrub habitat.

Road reconstruction and maintenance would occur during project implementation to support logging trucks or regular vehicular traffic. Road reconstruction involves re-pulling/re-shaping ditches and possibly the addition of clay or rock where necessary to support logging trucks. Road maintenance involves clearing, shaping, borrow placement and erosion control.

Effects Analysis

The two confirmed populations of *C. fragrans* are located in Management Areas 7.1 and 8.4. Neither of the Management Areas is subject to harvest operations for the purpose of timber production but may be subject to other management activities such as prescribed fire, thinning or non-commercial sand pine harvest to create open scrub habitat. More generally, since the species has potential to occur in any of the scrub or sandhills habitats on the ONF, the effects analysis will assume the species is potentially present in all the Management Areas that contain suitable habitats.

Direct effects

There is little empirical information in the literature on the effects of land management activities on *C. fragrans*. *C. fragrans* individuals have been found in habitat "that had not been burned in 30 years" (USFWS 1999), so individuals could possibly exist in mature sand pine scrub habitat subject to timber harvest (scrub in MA 8.2 or 8.4). Individuals in mature sand pine stands could be disturbed or killed by harvest activities, but the chances of this are low due because: 1) there is low potential for occurrence in mature sand pine scrub; and 2) *C. fragrans* possesses a deep taproot that can extend from 0.5 to 2 meters (19.6-78.7 inches) underground and would protect it from disturbance during harvest activities, although aboveground vegetation may be crushed (NatureServe 2015).

There is no harvest of mature yellow pine species in Management Areas that cover sandhills habitat on the ONF (Management Areas 7.1 & 7.3). However, heavy equipment may be used in sandhills to improve habitat quality by reducing the midstory component or removing off-site pine species. Such projects would also result in soil and vegetation disturbance, but at a lower intensity and less spatial coverage than timber harvest operations.

Like many other species adapted to fire-prone habitats, *C. fragrans* has physiological characteristics suggesting a resprouting response to fire: descriptions of the plant variously refer to a deep taproot or a thick horizontal rhizome from which the plant resprouts following fire (Cary et al 2015, NatureServe 2015). Lewis (2007) found that the number of individuals in populations decreased

with time since fire, further supporting the dependence of this species on fire-maintained habitats. Despite the physiological adaptation and exclusive occurrence in fire-dependent habitats, the limited data available do not suggest a wholly beneficial effect of fire on *C. fragrans* individuals. Weekley and Menges (2003) found that only approximately half of individually monitored *C. fragrans* individuals resprouted the year after a prescribed fire, which is substantially less than some other obligate resprouting scrub species.

Seeding of sand pine in scrub habitat would not create any significant risk of mortality since these activities would generally be conducted after harvest of mature sand pine stands that are poor habitat for *C. fragrans*. However, if *C. fragrans* is present and responds positively to timber harvest is is possible that the seeding tractor would damage aboveground vegetation. Planting pines in sandhills using planting crews would not introduce any significant risk of mortality because any disturbance would be to minor and only to the aboveground vegetation. Planting pines in sandhills using machinery would introduce a very minor chance of mortality. Any roots or rhizomes of *C. fragrans* individuals directly in the path of the planting machine could become damaged by the furrow implement. Mortality would occur only via a "direct hit" and the probability of such an encounter is extremely low.

Disturbance of the aboveground vegetative body may also occur should any *C. fragrans* individuals occur near Off-highway Vehicle (OHV) trails or Forest Service roads. A low level of disturbance would be easily tolerated, but repeated disturbance could kill individual plants occurring within trail boundaries. Neither of the current locations occurs near OHV trails or Forest Service roads.

Indirect effects

Harvest, roller-chopping, thinning, mowing and prescribed burning activities would remove or reduce the canopy layer, increase areas of open bare ground, and decrease competition – all conditions that are favorable to *C. fragrans*. These activities would provide positive indirect effects, which appears to be supported by the discovery of populations in areas subject to recent management activities. Seeding with sand pine in the scrub and planting pines in the sandhills would have a negative indirect effect by establishing a canopy which could shade out individuals that establish themselves in stands after harvest and burning activities. OHV use and road reconstruction/maintenance may maintain openings for *C. fragrans*, but this indirect effect would be mitigated any repeated disturbance from these activities.

Cumulative effects

There are no current populations of *C. fragrans* on the ONF that are located near state or private lands. Potential habitat exists in Seminole State Forest to the southeast of the ONF but there is a paved county road between the two properties. Ongoing activities to improve Florida Scrub-Jay habitat on the Seminole State Forest would benefit *C. fragrans*. The proposed actions, when considered along with past, present, and reasonably foreseeable actions, will benefit *Clitoria fragrans* by maintaining and improving habitat quality for the species on the Ocala National Forest.

Effects Determination

Implementation of the management activities in the National Forests in Florida Revised Land and Resource Management Plan **may affect and are likely to adversely affect** *Clitoria fragrans*. As described above, there is potential for individuals to be damaged or killed by heavy equipment use, prescribed fire or OHV use. The number of individuals affected cannot be determined but the level of impact is not expected to be significant. Additionally, this species is adapted to disturbance and management activities in currently suitable but apparently unoccupied habitat should maintain or improve conditions. Known populations would be protected subject to the Forest Plan standards and guidelines for managing other federally listed threatened and endangered plant species that occur on the Ocala National Forest.

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Appendix 1. Photographs of *Clitoria fragrans* and surrounding habitat

Photo 1. *C. fragrans* individuals at initial vouchered site in sand pine scrub.

Photo 2. Linear strip and canopy gap in stand where plants were found.

Photo 3. Burned mature stand with *C. fragrans* is in background. Surrounding habitat is open recently burned sand pine scrub.

Photo 4. Several *C. fragrans* individuals at sandhills site.

Photo 5. Habitat looking north from one group of *C. fragrans* individuals.

Photo 6. Photo of second concentration, with locations of several individuals noted.